

## SUMMARY OF UPPER ATMOSPHERIC RESEARCH

**A. Title of Research Task:** Ames ER-2 Ozone Measurements.

**B. Investigators and Institutions:** R. Pearson, Jr., J. F. Vedder, and W. L. Starr (Retired), NASA Ames Research Center.

**C. Abstract of Research Objectives:** The objective of this research is to study ozone ( $O_3$ ) in the stratosphere. Measurements of the ozone mixing ratio at 1 s intervals are obtained with an ultraviolet photometer which flies on the ER-2 aircraft.

**D. Summary of Progress and Results:** The photometer determines the amount of ozone in air by measuring the transmission of ultraviolet light through a fixed path with and without ambient  $O_3$  present. It was completed in 1986 and used in both the Stratospheric Tropospheric Exchange Project and the Airborne Antarctic Ozone Experiment (AAOE). During this reporting period Walter Starr, the former P. I., retired. Richard Pearson, Jr. took over as the new P. I.

In October, 1987, the instrument obtained data on ER-2 flights from Puerto Montt, Chile, to Panama and from Panama to Moffett Field, California.

During February, 1988, it was used in the ER-2 Polar Vortex experiment, which included Harvard's CIO instrument and the Whole Air Sampler (the jointly operated NASA Ames and National Center for Atmospheric Research instrument). The instrument was flown from Moffett Field into the region of maximum wind around the vortex. Both  $O_3$  and CIO increased during the northbound direction of the flight, as reported by Brune et al. (see below). Data obtained during the AAOE were also presented by Starr and Vedder in a poster paper at the Snowmass meeting in May, 1988, and reported in a paper by them accepted by J. Geophys. Res. for the special issue.

The photometer was operated in two piggy back flights, one in late 1988 and the other in early 1989, to acquaint the new P.I. with its operation and to keep it operational pending new support in FY 90.

**E. Journal Publications:** There are 9 referred publications that utilized data obtained with this instrument and had W. L. Starr or W. L. Starr and J. F. Vedder as co-authors.

Measurements of Ozone in the Antarctic Atmosphere During August and September 1987 (1989): W. L. Starr and J. F. Vedder, J. Geophys. Res.

In Situ Northern Mid-Latitude Observations of CIO,  $O_3$ , and BrO in the Wintertime Lower Stratosphere (1988): W. H. Brune, D. W. Toohey, J. G. Anderson, W. L. Starr, J. F. Vedder, and E. F. Danielsen, Science, **242**, 558-562.

Kinetics of  $O_3$  Destruction by CIO and BrO within the Antarctic Vortex: An Analysis Based upon In Situ ER-2 Data (1989): J. G. Anderson, W. H. Brune, S. A. Lloyd, W. L. Starr, M. Loewenstein, and J. R. Podolske, J. Geophys. Res.

Intercomparison of Ozone Measurements Over Antarctica (1989): J. J. Margitan, G. A. Brothers, E. V. Browell, D. Cariolle, M. T. Coffey, J. C. Farnen, C. B. Farmer, G. L. Gregory, J. W. Harder, D. J. Hofmann, W. Hypes, S. Ismail, R. O. Jakoubek, W. Komhyr,

S. Kooi, A. J. Krueger, J. C. Larsen, W. Mankin, M. P. McCormick, G. H. Mount, M. H. Proffitt, A. R. Ravishankara, A. L. Schmeltekopf, W. L. Starr, G. C. Toon, A. Torres, A. F. Tuck, A. Wahner, and I. Watterson, J. Geophys. Res.

Transport into the South Polar Vortex in Early Spring (1989): D. L. Hartmann, L. E. Heidt, M. Loewenstein, J. R. Podolske, J. F. Vedder, W. L. Starr, and S. E. Strahan, J. Geophys. Res.

Implications of AAOE Observations for Proposed Chemical Explanations of the Seasonal and Interannual Behavior of Antarctic Ozone (1989): M. K. W. Ko, J. M. Rodriguez, N. D. Sze, M. H. Proffitt, W. L. Starr, A. J. Krueger, E. V. Browell, and M. P. McCormick, J. Geophys. Res.

Condensed Nitrate, Sulfate and Chloride in Antarctic Stratospheric Aerosols (1989): R. F. Pueschel, K. G. Snetsinger, J. K. Goodman, O. B. Toon, G. V. Ferry, V. R. Oberbeck, J. M. Livingston, W. Verma, W. Fong, W. L. Starr, and K. R. Chan, J. Geophys. Res.

Nitrogen and Chlorine Species in the Spring Antarctic Stratosphere: Comparison of Models with AAOE Observations (1989): J. M. Rodriguez, M. K. W. Ko, N. D. Sze, S. D. Pierce, J. G. Anderson, D. W. Fahey, K. Kelly, C. B. Farmer, G. C. Toon, M. T. Coffey, L. E. Heidt, W. G. Mankin, K. R. Chan, W. L. Starr, J. F. Vedder, and M. P. McCormick, J. Geophys. Res.

Correlations of N<sub>2</sub>O and Ozone in the Southern Polar Vortex During the Airborne Antarctic Ozone Experiment (1989): S. E. Strahan, M. Loewenstein, J. R. Podolske, W. L. Starr, M. H. Proffitt, K. Kelly, and K. R. Chan, J. Geophys. Res.